REMARKS

In the Office Action the Examiner noted that claims 1, 3-6 and 8 were pending in the application and the Examiner rejected all claims. By this Amendment, various claims have been amended. The Examiner's rejections are traversed below.

The Rejections

In items 3 and 4 on pages 2-7 of the Office Action the Examiner has rejected the claims as unpatentable over U.S. Patent 6,025,947 to Sugaya et al., either taken alone or in combination with U.S. Patent 6,094,296 to Kosaka.

U.S. Patent 6,094,296 to Kosaka

The Kosaka patent is directed to an optical amplification apparatus for adjusting optical power of wavelength-multiplexed signal light at respective wavelengths, and for adjusting the optical output power at the respective wavelengths and a deviation of the optical power between the wavelengths.

As illustrated in Figure 5, Kosaka discloses an optical power adjusting unit 8 which adjusts the optical power of light at respective wavelengths as well as a deviation of the optical power between the respective light at the respective wavelengths. Then, the adjusted signal light is outputted to an optical amplifier unit 9 (column 5, lines 26-34). Thus, the optical power adjusting unit 8 amplifies or attenuates the light of at least one wavelength included in the WDM optical signal, independently from the light of other wavelengths.

U.S. Patent 6,025,947 to Sugaya et al.

The Sugaya et al. patent is directed to a controller which controls a variable optical attenuator to control the power level of a wavelength-multiplexed optical signal when the number of channels is varied. Sugaya discloses a control method for a WDM optical transmission system capable of transmitting optical signals that are stable with variation in

channel numbers. Specifically, Sugaya et al. discloses controlling a light transmissivity and the like of an optical attenuator, so that WDM optical signals at a level corresponding to the number of channels are amplified and output, prior to varying the number of channels. Sugaya temporarily fixes the light transmissivity of the optical attenuator when notified of the variation in the number of channels, to adjust the output light level corresponding to the number of channels by operating an optical amplifier in accordance with automatic gain control. A light transmissivity control of the optical attenuator is started when the variation in the number of channels is completed by an automatic level control circuit.

<u>The Prior Response</u>

In the prior response the applicants urged with respect to claim 1 that the optical attenuation amount corresponding to the signal wavelengths of input light, is controlled, so that the optical signal power level at the respective wavelengths to be analyzed by the spectral analysis section following the variation in the number of wavelengths is maintained to be approximately a constant. The applicants also urged that the optical power level per one wavelength of the WDM optical signals input to the optical amplification section becomes a level corresponding to the number of wavelengths following the variation. Applicants also urged that Sugaya et al. does not disclose a control for the level deviation between respective wavelengths in the output of the optical amplification section. In addition, applicants urged that Sugaya et al. does not disclose the control of the optical attenuation section at the time of variation in the number of wavelengths.

<u>The Examiner's Response in the Current Office Action</u>

The Examiner has responded to the prior arguments in item 5 on pages 7 and 8 of the current Office Action. In this sentence spanning pages 7 and 8 of the Office Action the Examiner emphasized that claim 1 recited controlling the amount of optical attenuation so that the power level of the optical signal of each wavelength analyzed by the spectral analysis section <u>following</u> the wavelength number variation, is approximately a constant. On page 8 the Examiner urged that in Sugaya the control of optical attenuation occurs following the wavelength number variation. Further, the Examiner took the position that lines 17-63 teach this feature.

The Present Claimed Invention Patentably Distinguishes Over the Prior Art

In order to clarify the features of the present claimed invention, the applicants have amended claims 1 and 8. In addition, the prior recitation "following the wavelength number variation" has been deleted from these claims based on the Examiner's comments.

Claim 1

Referring to claim 1, as amended, it is submitted that the prior art does not teach or suggest the claimed features wherein the optical attenuation section is located at a stage prior to the optical multiplexing section. In addition, it is submitted that the prior art does not teach or suggest individually controlling the amount of optical attenuation corresponding to each wavelength of the optical signal input to the optical attenuation section. Therefore, it is submitted that claim 1 patentably distinguishes over the prior art.

In the present invention, the deviation between light levels of the respective wavelengths included in the WDM light is controlled by controlling each optical attenuation amount in the optical attenuation section to individually attenuate the power level of each of a plurality of input optical signals of different wavelengths, so that the power level of the optical signals of each wavelength analyzed by the spectral analysis section following the wavelength variation is approximately constant. In contrast, in Sugaya et al., the optical attenuation amount at the second part 2000 (optical attenuation section) is controlled so that the total power of light output from the first part 1000 (optical amplification section) following the wavelength number variation is at a constant level, rather than each power of the respective wavelengths included in the WDM light.

As illustrated in Figures 1 and 2 of the subject application, in the present invention, the optical attenuation unit 1_1 into which 8 signal waves are input, has optical processing systems 10_1 to 10_8 corresponding to the respective wavelengths. Each of the optical processing systems 10_1 to 10_8 is provided with the variable optical attenuation module 13. The power levels of the respective wavelengths are individually controlled by the respective variable optical attenuation modules 13. In contrast, in Sugaya et al., as shown in Figures 3, 10 and 20, the single optical attenuator 64 is provided inside the second part 2000. The total power of the WDM light output from or input into the first part 1000 is in a batch controlled by the optical attenuator 64.

Figure 1 of the attached Exhibit A illustrates the differences described above. The optical attenuation section is illustrated by portion (a) of Figure 1 which individually adjusts the power of the optical signals of the respective wavelengths before the wavelength multiplexing

section multiplexes signal light of a plurality of wavelengths. In contrast, the optical attenuator of Sugaya et al. is located in portion (b) of attached Figure 1, and adjusts the total power level of the WDM light after the wavelength multiplexing section multiplexes signal light of a plurality of wavelengths.

The above-described structural difference results in the following differences between the present invention and Sugaya et al. Figure 2 of attached Exhibit A illustrates a conceptual pattern diagram showing an example of spectrum output from the optical attenuator.

As described above, the optical attenuator of Sugaya et al. controls the total power level of the multiplexed signal light to be at a constant level. This control by Sugaya et al. means that an area of a signal light spectrum, is controlled to be constant, as illustrated by the spectrum in Figure 2 of attached Exhibit A. Therefore, since the total power level is merely controlled to be constant, the levels of wavelengths λ1 to λ4 may still be unequal as shown in reference Figure 2(A). In contrast, in the present invention, the sprectra as shown in reference Figure 2(A) are monitored, and the power levels of the respective wavelengths which have not been multiplexed, are individually adjusted by the optical attenuation section in accordance with the monitoring result. Therefore, the optical power of each wavelength is controlled to be at a constant level as shown in attached reference Figure 2(B).

In Sugaya et al., because each signal light power is not adjusted for each wavelength, some levels of some wavelenghs may be reduced so that signal errors may occur. In contrast, in the present claimed inventon, since the signal light power of each wavelength is compensated, a stable WDM optical transmission for every wavelength can be realized. Therefore it is submitted that Sugaya et al. does not teach or suggest the above-described features.

The Kosaka references discloses the control of a level deviation between the respective wavelengths. However, as recognized by the Examiner, Kosaka does not disclose or suggests any control corresponding to wavelength number variation. Further, it is submitted that one of ordinary skill would not have been lead to combine the teachings of Sugaya et al. and Kosaka to achieve the present claimed invention.

<u>Claims 3-6</u>

Claims 3-6 depend, directly or indirectly from claim 1 and include all the features of that claim plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that claims 3-6 patentably distinguish over the prior art.

Claim 8

Referring to Claim 8, it is submitted that the prior art does not teach or suggest:

> "when a variation in the number of wavelengths being input occurs, individually controlling an amount of optical attenuation corresponding to each wavelength of the optical signal being input, so that the power level of the optical signal is approximately constant, and so that the optical power level per single wavelength of the wavelength division multiplexed optical signal input into the optical amplification section is of a level which corresponds to the varied number of wavelengths."

Therefore, it is submitted that claim 8 patentably distinguishes over the prior art.

Summary

It is submitted that none of the references, either taken alone or in combination teach the present claimed invention. Thus, claims 1, 3-6 and 8 are deemed to be in a condition suitable for allowance. Reconsideration of the claims and an early notice of allowance are earnestly solicited.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 8-18-03

By: John C. Garvey
John C. Garvey
Registration No. 28,607

1201 New York Ave, N.W., Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501

CERTIFICATE UNDER 37 CFR 1.8(a)
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
on August 18, 20 03
STAAS & HALSEY
By: Yvonne T. Reyes
Date: August 18, 2003

EXHIBIT A

Fig.1

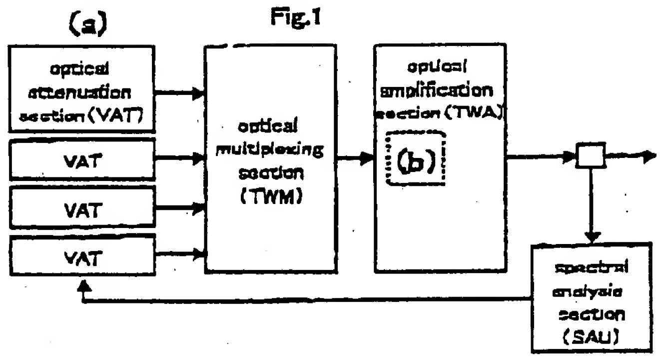
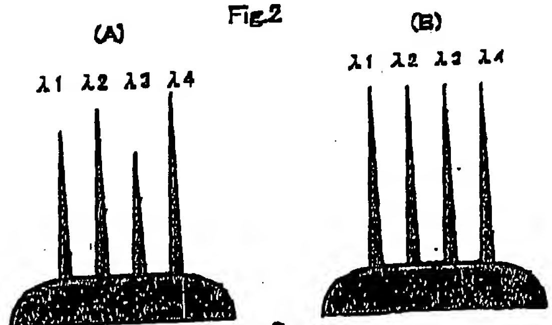


Fig.2



3